REMARKS

Favorable reconsideration of the present application is respectfully requested.

The claims have been amended to recite that the high temperature/high pressure treatment of the casting is an HIP treatment. Basis for this is found throughout the specification.

It has been known to carry out solution treatment of a cast of aluminum alloy cast product simultaneous with an HIP treatment (paragraph bridging pages 2-3). However this introduces the problem that when the pressure is reduced at the termination of the HIP treatment, the resulting cooling can cause an undesirable drop in the temperature of the casting which is simultaneously undergoing solution heat treatment. Thus, in the absence of steps to maintain the temperature of the aluminum alloy casting, the pressure reduction at the end of the HIP treatment will also reduce the temperature of the casting (page 3, lines 5-10).

The present invention therefore provides that a method for reforming mechanical characteristics of an aluminum alloy casting by subjecting the casting to the action of temperature and pressure (e.g., HIP) includes a step of reducing the pressure while maintaining the temperature of the casting. For example, this may be done by heating using a heater in the HIP apparatus (paragraph bridging pages 8-9), by covering the workpiece with a heat resistance porous insulator (page 9, lines 2-7) or by maintaining the casting in the interior of a heat insulating structure (Fig. 6).

Claims 1, 2 and 5 were rejected under 35 U.S.C. § 103 as being obvious over Clark in view of JP '951. Additionally, Claims 3, 4 and 6 were rejected under 35 U.S.C. § 103 as being obvious over Clark in view of JP '951 and the ASM Handbook article which describes an autoclaving furnace. Applicants respectfully submit that the amended claims define over this prior art.

1. **JP '951 is not analogous art.** Applicants had previously pointed out that JP '951 is directed to ageing of an extruded aluminum alloy, and is not analogous prior art. In response, the outstanding Office Action has taken the position that JP '951 is analogous prior art because both Clark and JP '951 "are drawn to solution heat treating aluminum alloys in order to improve properties."

While the Office Action points to similarities in the technologies of Clark and JP '951, it also recognizes that they are in different technological arts. In such a case, one cannot conclude that prior art is analogous simply because it is possible to identify certain similarities in the various arts. Analogous prior art is limited to that which is reasonably pertinent to the particular problem with which the inventor is involved. MPEP § 2141.01(a)(I). For example, *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992) (*Id.*), the applicant claimed an improvement in a hose clamp which differed from the prior art in the presence of a preassembly "hook" which maintained the preassembly condition of the clamp and disengaged automatically when the clamp was tightened. The Board relied upon a reference which disclosed a hook and eye fastener for use in garments, reasoning that all hooking problems are analogous. However, the court held that the reference was not within the field of applicant's endeavor and was not reasonably pertinent to the particular problem with which the inventor was concerned, because it had not been shown that a person of ordinary skill, seeking to solve a problem of fastening a hose clamp, would reasonably be expected or motivated to look to fasteners for garments. Thus it must be determined whether JP '951 is reasonably pertinent to the problem confronting the inventors in the present application.

As has previously been explained, the problem confronting the present inventors is that cooling due to the gas pressure reduction at the termination of an HIP treatment can cause an undesirable drop in the temperature of the casting which is simultaneously

undergoing solution heat treatment (page 3, lines 5-10). Clark discloses an HIP treatment, and so suffers from this same problem. JP '951, on the other hand, simply discloses the heat ageing of an *extruded* aluminum ally. The extrusion of the alloy in JP '951 is not an HIP treatment and does not involve cooling due to a gas pressure reduction similar to that following HIP treatment, and so it is not pertinent to solving the problem of a temperature drop following an HIP treatment. Thus, whatever similarities can be identified between the technologies of Clark and JP '951, JP '951 does not qualify as analogous prior art.

2. **Heat treatment of an extruded material after its extrusion, in order to strengthen the extruded material, would not motivate one skilled in the art to add heat to maintain the temperature of a casting following an HIP treatment of the casting.** The Office Action points out that neither Clark nor JP '951 teaches a step of intentionally cooling a material prior to its heat treatment, and that avoiding such a cooling step in Clark would be desirable to save energy. However, it is respectfully submitted that this argument is misplaced since it ignores the fact that cooling inherently occurs in Clark – without an intentional cooling step – due to gas depressurization at the termination of HIP treatment. The relevant question, therefore, is not whether JP '951 would have suggested that a post HIP heat treatment should be performed without an intervening intentional cooling step, but whether JP '951 would have suggested adding heat to the HIP treatment in Clark at a time and amount sufficient to counter the inherent cooling that occurs due to gas depressurization at the termination of the HIP treatment. Since JP '951 is not concerned with HIP treatment, it could not provide such a suggestion.

3. **JP '951 fails to provide a teaching for modifying Clark according to the claimed invention.**

In JP'951, an extruded material is actively cooled immediately after the extrusion, as described in **[0004]**.

JP'951 discloses a course of processes including a solution treatment as an option, as described in **[0015]**. Even in this case, the temperature holding more than or equal to 20 °C is performed after the solution treatment as understood from **[0021],** not between the extrusion and the solution treatment. Please note that Table 3 contains four samples whose holding temperatures are 10, 20 40 and 45 °C in order to show the criticality of the lower limit 20 °C.

JP'951 limits the holding temperature broadly more than or equal to 20 °C without an upper limit. However, the actually intended temperature is around 40-45 °C as shown Table 3. The temperature is far below HIP treatment temperature of around 500 °C which is disclosed in the specification of the present application.

The purpose of the temperature holding in JP'951 is improving the proof strength as understood from **[0007]** and **[0008]**. For this purpose, it is not necessary to hold the temperature as high as 100 °C. JP'951 mentions nothing about energy saving.

4. <u>The Office Action does not provide a basis in fact or technical reasoning to reasonably support the conclusion that the autoclave furnace chamber of the ASM Handbook is necessarily porous</u>. Claims 3 and 4 further recite that the casting is accommodated in a heat insulating structure or covered with a heat resistant porous heat insulator during the high temperature/high pressure treatment and the solution treatment. The Office Action recognizes that this is not taught in <u>Clark</u> or JP '951 but concludes that "the ASM Handbook is held to have at least some degree of porosity."

Applicants respectfully submit that the unsupported conclusion that "the ASM Handbook is held to have at least some degree of porosity" is legally insufficient to support a prima *facie case* of obviousness based on inherency. "In relying upon the theory of

inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original); MPEP § 2112(IV). Simply stating that the ASM Handbook is "held" to have at least some degree of porosity, without providing a basis in fact and/or technical reasoning to reasonably support this conclusion, does not satisfy this requirement. It is therefore respectfully submitted that the Office Action fails to set forth a *prima facie* case of obviousness of Claims 3, 4 and 6.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early Notice of Allowance.

Respectfully submitted,

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Partial English Translation of JP-2001-158951-A

【0004】
【Means for Solving the Problem】
In order to achieve the object, a manufacturing method according to the present invention is characterized in that Al-Mg-Si series aluminum alloy is extruded so that, the extruded material is cooled at a cooling rate of more than or equal to 50 ℃/min in the temperature range of 450 to 200 ℃, then the cooled extruded material is held at a temperature more than or equal to 20 ℃ for more than or equal to 3 hours between the point of time when the extrusion is completed and that when an aging treatment is started, and undergoes an aging treatment at 160 to 220 ℃ for 2 to 12 hours.

【0007】
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It was found that the way of progress of natural aging varies depending on the temperature if an extruded material is left in a temperature range between below 0 ℃ and about 50 ℃ for a long time.

Specifically, as shown in Fig. 1 that shows effects of holding temperature and time on 0.2% proof strength of a 6063 aluminum alloy extrusion which undergoes T5 treatment of 180 ℃ × 6 hours, an extruded material which is held at a temperature more than or equal to 20 ℃ and then undergoes an aging treatment has a proof strength of more than or equal to that of a extruded material which undergoes an aging treatment immediately after the extrusion. In contrast, an extruded material which is held at a temperature below 20 ℃ and then undergoes an aging treatment has a proof strength of considerably less than that of a extruded material which undergoes an aging treatment immediately after the extrusion.
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【0015】
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Otherwise, T6 treatment can also be applied which comprises a solution treatment at a temperature of 480 to 580 ℃ for 1 to 8 hours, a quenching after the solution treatment and an aging treatment under the same condition.
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【0021】
【Example 2】
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A billet of an Al-Mg-Si series aluminum alloy 2 underwent a homogenization treatment of 580 ℃ × 2 hours and then was heated to 480 ℃ to extrude into a shape having a hollow section of 100mm × 100mm, a thickness of 2mm and a length of 40m. Each extruded material underwent a T6 treatment of 540 ℃ × 1 hour and then water cooling. The extruded materials after the T6 treatment held at various times and temperatures before an aging treatment as shown in Table 3. After that, they underwent an aging treatment of 180 ℃ × 6 hours
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